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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/506,691	09/03/2004	Rogeli Ferrer	0595-1037	4703
466	7590	09/09/2005		
YOUNG & THOMPSON 745 SOUTH 23RD STREET 2ND FLOOR ARLINGTON, VA 22202			EXAMINER MOFFAT, JONATHAN	
			ART UNIT	PAPER NUMBER
			2863	
DATE MAILED: 09/09/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/506,691

Applicant(s)

FERRER, ROGELI

Examiner

Jonathan Moffat

Art Unit

2863

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 03 September 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 September 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 3/11/2005
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Claim Objections***

Claim 1 is objected to because of the following informalities: The phrase “of a particular type of rotary wing aircraft” does not limit or further define the claim language and is not necessary. This follows for every proceeding instance of “said particular type”. Appropriate correction is required.

Claim 16 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. The claim language does not describe when this step is to take place in the overall sequence of events.

Claims 5 and 10 are objected to because of the following informalities: The word miss-adjustment is misspelled in several instances. Appropriate correction is required.

Claim 13 is objected to because of the following informalities: The symbols  $\gamma$  and  $\alpha$  are used to correspond to a vector and adjustment parameter respectively in an equation therein. The same symbols have been previously used to denote steps situation in claims 1 and 2. The examiner understands the distinction but it may lead to confusion down the line. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 17-19 are rejected under 35 U.S.C. 102(e) as being anticipated by Harrison (US pat 6,301,572).

With respect to claim 17, Harrison discloses an apparatus comprising:

1) A calculator suitable for automatically determining said defects and said adjustment values on the basis of a neural network and on the basis of measurement values of a Second Series Of measurements (Fig 1).

2) Interface means between said apparatus and an operator, enabling the operator to input said measurement values of said second series of measurements into said calculator (column 12 lines 16-28).

3) Indicator means for informing said operator of the defects and the adjustment values determined by said calculator (Fig 1 item 40).

With respect to claim 18, Harrison discloses that said calculator is suitable for determining said neural network on the basis of measurement values of a first series of measurements, and in that said interface means further enables said operator to input into said calculator said measurement values of said first series of measurements (Figs 1 and 15).

With respect to claim 19, Harrison discloses that it further includes a memory for storing said neural network (Fig 1 item 32).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-2, 4-16, are rejected under 35 U.S.C. 103(a) as being obvious over Harrison in view of Bechhoefer (US pat 6,567,757).

With respect to claim 1, Bechhoefer teaches vibration analysis to detect defects of a rotary wing aircraft (Figs 1 and 4).

Harrison fails to disclose using his method on, specifically, a rotary wing aircraft.

Harrison discloses a method comprising:

1) In a preliminary step, in which a reference aircraft is used corresponding to a rotary wing aircraft of said particular type, having its rotor without defect and adjusted to a reference setting for which the vibration level of at least one portion of said aircraft is at a minimum, the following operations are performed:

a) Taking at least a first series of measurements on said reference aircraft, by measuring, during particular operation of said reference aircraft, the values of at least two accelerations which are measured at arbitrary locations of said portion of the reference aircraft and which are representative of the vibration generated at said portion of the reference aircraft (Fig 15).

α) Firstly using the rotor of the reference aircraft which is without defect and which is adjusted on said reference setting (column 10 line 66- column 11 line 5).

β) Secondly by introducing defects into said rotor (column 10 line 66- column 11 line 5).

b) On the basis of said first series of acceleration measurements and assuming that the aircraft is a deformable body, determining a neural network that illustrates the relationships between said accelerations and at least said defects (Fig 1 items 32, 34, 52).

2) In a later step, for at least defecting any defects of the rotor of a particular rotary wing aircraft of said aircraft type, the following operations are performed:

a) Taking a second series of measurements are taken on said particular aircraft by measuring the values of at least some of said accelerations at said portion of the aircraft during particular operation of said aircraft (Fig 16).

b) On the basis of said second series of acceleration measurements and on the basis of the neural network determined in step 1/b), detecting any defects of said rotor (Fig 16).

It would have been obvious to one of ordinary skill in the art to use the method of Harrison on a rotary wing aircraft as does Bechhoefer, in order to predict early failure and prevent catastrophic failure (Harrison column 1 lines 11-18).

With respect to claim 2, Harrison discloses a method comprising:

1) In the preliminary step, the following operations are performed:

b) On the basis of said first series of acceleration measurements, determining said neural network which illustrates the relationships between firstly said accelerations and secondly said defects and said adjustment parameters (Fig 15).

Harrison fails to disclose additionally varying adjustment values during said reference aircraft step. Harrison further fails to disclose determining adjustment values to minimize rotation.

Bechhoefer teaches the steps of:

a) Taking said first series of measurements on said reference aircraft in a situation  $\gamma$  in addition to said situations  $\alpha$  and  $\beta$ , by measuring, during the particular operation of said reference aircraft, the values of said accelerations which are representative of vibration generated at said portion of the reference aircraft and varying the adjustment values of a plurality of adjustment parameters of said rotor in said situation  $\gamma$  (column 2 lines 54-56).

2) In the later step, which is additionally for adjusting the rotor of the particular rotary wing aircraft of said type of aircraft, after said operations a) and b), the following operations are performed:

c) On the basis of said second series of acceleration measurements and of the neural network determined in step 1/b), determining the adjustment values of at least some of said adjustment parameters which enable the level of vibration of said portion of the aircraft to be minimized (column 2 lines 37-51).

d) Applying to the rotor of said aircraft the adjustment values as determined in this way for said adjustment parameters (column 2 lines 37-51).

It would have been obvious to one of ordinary skill in the art to include adjustment parameters as variables in the vibration data neural network training method of Harrison as taught by Bechhoefer. This would allow operators to examine the effects of corrective methods on the blades in order to prevent catastrophic failure.

With respect to claim 3, Harrison discloses between steps II/b and II/c eliminating any defects that have been detected in step II/b and by taking a new, second set of measurements for use in step II/c for determining the adjustment parameters (Fig 17 and column 11 lines 44-51).

With respect to claim 4, Harrison fails to teach specific adjustment elements and parameters.

Bechhoefer teaches that the adjustment elements defining said adjustment parameters comprise at least the following elements of the rotor of the aircraft:

- 1) At least one balance weight for each of the blades of the rotor (column 2 lines 54-56).
- 2) A pitch-link on each of the blades of the rotor, except for one blade, which represents a reference blade (column 8 lines 34-38).
- 3) At least one compensating tab on the trailing edge of each of the blades of the rotor (column 8 lines 26-29).

It would have been obvious to one of ordinary skill in the art to use the adjustment devices of Bechhoefer in the method of Harrison in order to evaluate all possible calibration solutions to a vibration problem in order to best assess how to repair it.

With respect to claim 5, Harrison fails to disclose specific reference flight patterns while training the neural network.

Bechhoefer teaches that said first series of measurements are taken during at least one of the following test flights:

- 1) A reference flight with the rotor adjusted in accordance with said reference setting (column 8 lines 38-49).
- 2) Flights with defects of the rotor (column 8 lines 38-49).
- 3) A flight with a particular miss-adjustment of at least one balance weight of a blade (column 8 lines 38-49).



4) A flight with a particular miss-adjustment of at least one pitch-link of a blade (column 8 lines 34-38).

5) A flight with a particular miss-adjustment of at least one compensating tab provided on the trailing edge of a blade (column 8 lines 26-29).

It would have been obvious to one of ordinary skill in the art to perform the neural network forming method of Harrison while making the adjustments prescribed by Bechhoefer in order to evaluate all possible calibration solutions to a vibration problem to best assess how to remedy vibrations and to assess which flight situations incur the worst vibrations.

With respect to claim 6, Harrison fails to disclose specific test flights.

Bechhoefer teaches said measurement flights during step 11/a) includes the following configurations, during which measurements are taken:

- 1) A stationary flight configuration (column 8 line 2).
- 2) A configuration of flight at about 50 m/s (column 8 line 3).
- 3) A configuration of flight at continuous maximum power (column 7 lines 64-67).
- 4) A test on the ground with the rotor revolving (column 8 line 2).

It would have been obvious to one of ordinary skill in the art to perform the neural network forming method of Harrison while in various flight configurations as prescribed by Bechhoefer in order to best assess which flight situations incur the worst vibrations.

With respect to claim 7, Harrison fails to disclose locating acceleration sensors on the cabin of a rotary-wing aircraft.

Bechhoefer teaches that for an advance and lift rotor of a rotary wing aircraft, said portion of the aircraft where the values of said accelerations are measured is the cabin of the aircraft (column 5 lines 33-35 and Fig 4).

It would have been obvious to one of ordinary skill in the art to locate the acceleration sensors on the cabin as does Bechhoefer in the system of Harrison in order to determine the vibration present in the portion of the aircraft where pilots and sensitive equipment are located since these are elements sensitive to such vibration.

With respect to claim 8, Harrison fails to disclose locating acceleration sensors on the tail boom of the aircraft.

Bechhoefer teaches that for an anti-torque tail rotor of a rotary wing aircraft, said portion of the aircraft at which the values of said accelerations are measured is the tail boom of the aircraft (column 5 lines 44-56).

It would have been obvious to one of ordinary skill in the art to locate sensors on the aircraft as does Bechhoefer in the method of Harrison in order to assess vibrations at various locations in order to determine a best adjustment remedy for the vibrations.

With respect to claim 9, Harrison fails to disclose measurements being taken while the aircraft is on the ground.

Bechhoefer teaches at least one of said first and second series of measurements is taken with the aircraft on the ground and with the tail rotor in operation (column 8 line 2).

It would have been obvious to one of ordinary skill in the art to perform the neural network forming method of Harrison while in various flight configurations as prescribed by Bechhoefer in order to best assess which flight situations incur the worst vibrations.

With respect to claim 10, Harrison teaches the assumption that the vibration level existing at any particular point of the aircraft corresponds to the sum of the elementary vibrations generated at said particular point and caused by the defects and the miss-adjustment of said adjustment parameters (column 7 lines 21-25).

Harrison fails to teach assuming non-isotropic rotors, and non-linear relationships between adjustment parameters and acceleration values.

Bechhoefer teaches the assumption that:

- 1) The rotor is not isotropic (Figs 2 and 3).
- 2) The relationships between firstly the defects and the adjustment parameters and secondly the acceleration values are non-linear (column 8 lines 29-33).

It would have been obvious to one of ordinary skill in the art to make the assumptions of Bechhoefer in the method of Harrison. It is well known that rotors are not uniform enough in shape to vibrate isotropically. It is equally well known that the shape of an aircraft and the complexity of its structure make linear analysis of vibrations impractical. It would have been obvious to assume these factors in order to create a more accurate neural network.

With respect to claim 11, Harrison discloses that during step II/b, the defects that are detected are displayed (Fig 1 item 40 and column 11 lines 52-60).

With respect to claim 12, Harrison discloses during step II/b, the defects that are detected are recorded (Fig 1 item 32).

With respect to claim 13, Harrison discloses finding required adjustments but fails to disclose minimizing a specific expression.

Bechhoefer teaches the adjustment value of an adjustment parameter is determined by minimizing the expression  $\|R(\alpha) + \gamma\|^2$  (column 3, first paragraph).

It would have been obvious to one of ordinary skill in the art to use the minimization method of Bechhoefer in the neural network of Harrison in order to determine the adjustment parameter in a simple way, allowing for smaller processor delay in the neural network.

With respect to claim 14, Harrison discloses during step II/c; the adjustment values that have been determined are displayed (Fig 1 item 40 and column 11 lines 52-60).

With respect to claim 15, Harrison discloses during step II/c, the adjustment values that have been determined are recorded (Fig 1 item 32).

With respect to claim 16, Harrison discloses:

- 1) Taking a third series of measurements while causing the adjustment values of only some of said adjustment parameters to vary (column 11 lines 44-51).
- 2) Adjusting said neural network on the basis of said third series of measurements, for the corresponding relationships which relate to the adjustment parameters for which the adjustment values have been varied (Fig 17).

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. McCool (US pat 6,466,888) discloses a system very similar to that of the invention, not specifically limited to vibration data. Ventres (US pat 6,415,206) discloses a system very similar to that of the invention but without the neural network.

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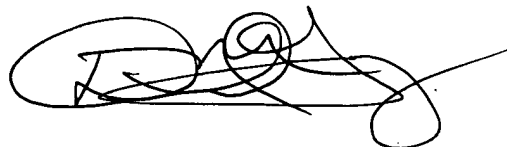
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Moffat whose telephone number is (571) 272-2255.

The examiner can normally be reached on Mon-Fri, from 7:00-3:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Barlow can be reached on (571) 272-2269. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JM

A handwritten signature in black ink, appearing to read 'David Gray', with a large, stylized flourish extending from the end of the signature.

David Gray  
Primary Examiner